

MARINE MOLLUSCS FROM LORD HOWE ISLAND, NORFOLK ISLAND,
AUSTRALIA AND NEW CALEDONIA.

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(Plates xxxii.-xxxiv.)

(Contribution from the Australian Museum, Sydney.)

In an attempt to determine exactly the relationships of molluscs from Lord Howe Island it became imperative to describe many from the adjacent lands.

Fifty years ago, Brazier supplied names for a collection of molluscs made at Lord Howe Island by an Australian Museum party led by R. Etheridge, Jr. These names were published, together with an ecological account, in a Monograph on the Island issued by the Museum. Many visits have since been made to the island by members of the Australian Museum staff, and a fairly representative collection of the larger molluscs has been accumulated. Mr. Roy Bell, about twenty-five years ago, made an excellent collection of the smaller shells by rock washing on the shore, and dredging off shore, so that sufficient material is available for a reasonable comparison to be made. The localities most commonly associated with Lord Howe Island in recent discussions have been Norfolk Island, the Kermadecs, New Caledonia and Eastern Australia. From all these places equally representative collections are at hand: from the two former, by the same collector, Mr. Roy Bell, so that exactitude in comparison is possible. The molluscs of New Caledonia have been well studied by excellent French conchologists, but they neglected the unattractive Limpets and limpet-like shells. There is probably the largest collection of New Caledonian molluscs yet brought together, in this Museum.

Brazier's names have been commonly cited, but, for the recognition of geographical relationships or alliances to-day, it is necessary that the species be more accurately determined. Thus Brazier named *Pectunculus tenuicostatus* Reeve, *Tridacna elongata* Lamk., *Lucina interrupta* Lamk., *Scutus unguis* var. *corrugatus* Reeve, *Trochus torresi* E. A. Smith, *Turbo imperialis* Linn., *Ricella plicatula* Phil., *Patella tramoserica* Martyn, *Engina armillata* Reeve, *Engina lineata* Reeve, *Fusus hanleyi* Angas, *Voluta nucleus* Lamk., *Conus anemone* Lamk., *Siphonaria denticulata* Q. & G., among others, but all these needed rectification. Some names have been already emended as *Veletuceta fringilla howensis* Ired. (= *Pectunculus tenuicostatus*), *Vulgodacna fossor* Hedley (= *Tridacna elongata*), *Lentilaria paytenorum* Ired. (= *Lucina interrupta*), *Turbo cepoides* E. A. Smith (= *T. imperialis*), and *Quibulla scotti* Ired. (= *Bulla ampulla*). It may be noted that Brazier named as new *Purpura smithi*, and a number of figures (reversed) were given on a plate, but no description included.

SCUTUS HOWENSIS sp. nov.

(Plate xxxii., figs. 5-6.)

Shell little elevated, elongate, sides parallel, mucro a little behind the centre, posterior area depressed, even slightly concave, the edge upturning a little, anterior slope slightly convex, anterior end clearly sinuate, posterior end broadly rounded. Pure white. The initial sculpture behind the mucro is wavy, closely set, concentric ridges, in front a subkeel is present which disappears early, the sculpture becoming regularly concentric ridges rather

widely spaced, some fifty being easily counted anteriorly. Lord Howe Island.

Length, 41 mm.; breadth, 21 mm.; height, 6 mm.

The diagnostic features are the flattening, the parallel sides, the regular sculpture and the upturning of the posterior end.

From Port Curtis, Queensland, the representative mollusc has an elevated shell, narrowing anteriorly, sculpture notably wavy, and shows no upturning. The anterior area slopes rather steeply and the anterior sub-keel is succeeded by even a slight depression, the sinuate end well marked. Length, 30 mm.; breadth, 17 mm.; height, 8 mm. This can be named *Scutus olunguis* sp. nov. (Plate xxxii., figs. 7-8). This ranges through Queensland, the only variation being in the degree of wrinkling in the sculpture, some specimens showing this feature very strongly, the most notable being dredged shells from Lindeman Island and Hope Islands. New Caledonian shells are lower and broader, with pronounced wrinkling, though the immature are more like the young Lord Howe Island shells. This may be called *Scutus parunguis* sp. nov., the type measuring 34 mm. long, 20 mm. broad, and 7 mm. high.

Sixty years ago the conchologist at the British Museum, E. A. Smith, reviewed the shells pertaining to this group from Museum specimens. At that time he was very inexperienced and his conclusions were obviously imperfect, yet no revision has since been attempted. For all the tropical forms he used *Scutus unguis* Linn., with five varieties, ignoring all geographical considerations. As Linne's *Patella unguis* has been shown to have nothing to do with this group a renomination must be made. Hedley recently corrected the southern forms but left the northern ones to be later done. The oldest name for the "unguis" series is *granulatus* Blainville, from Mauritius, *sinensis* Blainville, is available for the Chinese and Japanese species (*emarginatus* Philippi, being given to a Liew-Kiew shell), while *rüppeli* Philippi, is the Red Sea species. Quoy and Gaimard introduced *imbricatus* for the New Ireland species, the other names *corrugatus* Reeve, *angustatus* A. Adams, *elegans* Gray, being introduced for shells from unknown locality, and are at present unrecognizable.

Nannoscutum, introduced recently for a Lord Howe Island mollusc (Iredale, Austr. Zool., Vol. viii., p. 244, March 12, 1937) may be a descendant of an ancestral relative of the Neozelanic *Scutus*, whose shell is so different from those of the "unguis" group. As the type of *Scutus* is the southern Australian species *antipodes* Montfort, the Neozelanic *breviculus* may be nearer that, and the tropical *Scutus* with the particoloured animal should be separated as a subgenus *Aviscutum* nov., with *S. olunguis* as type, the shell being more elevated, the mucro more anterior, and the anterior end deeply sinuate, while the radular details differ.

MACROSCHISMA ENOPA sp. nov.

(Plate xxxii., fig. 9.)

Shell medium, ends rounded, sides straight, parallel, a little elevated, side slopes steep, shell twice as long as broad, foramen about half the length, narrowly triangular, posteriorly attingent. Coloration brownish white marked with purplish brown, which masses anteriorly, and also posteriorly where it is marked off by a decided line at about a quarter the length of the shell. Sculpture consists of closely packed radial ribs which are faintly granulose through intersection of concentric growth lines, which become more pronounced and almost form steps with age. Interior whitish, a notable callus surrounding the foramen.

Length, 17 mm.; breadth, 7 mm.; height, 4.5 mm.
Lord Howe Island.

It was somewhat surprising to find a species of *Macroschisma* in this locality, and to determine its apparent relationship the Australian and extralimital species had to be reviewed. It must be reiterated that the first introduction of *Macroschisma* is by Sowerby in 1839 (Conch. Illus., Fissurella, p. 5, No. 45, 1839), as this reference does not appear in Neave's Nomenclator Zoologicus. The type is the Japanese species incorrectly known as *maxima* A. Adams, and the Lord Howe Island species is apparently congeneric with that, its nearest relative being an unnamed species from New Caledonia. Sowerby named a shell *novaecaledoniae*, but it was a Tasmanian specimen quite unlike the tropical forms. The earlier name is *tasmaniae* Sowerby, and the shell is broad, the foramen short and broad, and obviously the group has developed independently. It is here generically separated with the name *Forolepas* nov., the type being the aforesaid *tasmaniae*, which ranges into southern New South Wales, through Victoria into South Australia, and is represented in Western Australia by *bakiei* Sowerby (A. Adams, MS.), which has the anterior radial sculpture much coarser. Another group is represented in South Australia by *producta* A. Adams, which is long, narrow, with very steep sides, the foramen long and narrow, and anteriorly from the foramen a broad raised ridge extends to the anterior margin. Posteriorly the foramen reaches to its margin almost excavating a fissure. This represents a different genus, which is named *Dolichoschisma* gen. nov., and the West Australian shells from Geraldton show the features in an exaggerated form. The anterior ridge developing into a spout, while the foramen, narrowly triangular, excavates the posterior margin so that it would be almost destroyed were it not reinforced internally by a thickened callus. The shell is 24 mm. long, 8.5 mm. in breadth, and 8 mm. in height, and is subspecifically named *D. p. munita* subsp. nov.

CALTHALOTIA PORTERI *sp. nov.*

(Plate xxxii., fig. 10.)

Shell trochiform, sides straight, periphery keeled in juvenile but rounded in adult, imperforate, but false umbilicus seen in young stages. Coloration greenish spotted with yellow, sometimes also with bluish, dead shells whitish with brownish, pale and dark, spots. Sculpture of scarcely nodulous concentric lirae; on the antepenultimate five with two larger forming the periphery; in the adult the last whorl has one large row below the suture, four smaller beaded rows intervening between this and the peripheral double row, the base showing seven similar scarcely beaded rows with a line between each. These are over-ridden by fine slanting threads, the nodules being sometimes distinct but more often almost obsolete. Columella arcuate, abruptly terminating in a notch, reflected over the false umbilicus, outer lip thin, slightly thickened inside. Operculum thin, multispiral, circular, horny. Height, 17 mm.; breadth, 15 mm.

Lord Howe Island.

This species has been recorded as *torresi* Smith, but is easily separated by its sculpture, while *torresi* itself has been regarded as a synonym of *arruensis* Watson, and Hedley in his MS. Catalogue has noted that the Lord Howe Island shell is nearer the New Caledonian one and that neither had been named.

The specific name is given for Dr. R. H. Porter, who made a collection at Lord Howe Island, and was interested and pleased to know this shell would bear his name.

CELLANA HOWENSIS sp. nov.

(Plate xxxii., figs. 1, 13; Plate xxxiii., figs. 4, 5, 6.)

Brazier included *Patella tramoserica* (the common Sydney limpet) with a note "at the Admiralty Isles it acquires a much larger size". The differences have been recognized by every collector since. Shell oval, elevated, apex at anterior fourth, a little narrower anteriorly, anterior slope almost straight, longer posterior slope a little convex. Colour green with blue markings, varying through paler shades almost to greenish white with a tinge of yellow, markings rarely becoming obsolete. Internally the spatula is whitish marked with a green line, outside the spatula greenish with blue radials, the margin regularly marked with blue lines. Sculpture of numerous ribs, a little raised, becoming generally less marked with age; fairly regular and even subnodulose in the juvenile, but the nodules soon vanish, the surface crossed with minute concentric striae. According to the rock upon which the limpet occurs, the shell may be soft and eroded, the ribs less pronounced and less elevated on soft rocks, while upon hard rocks the shell is taller, harder, showing little erosion with the ribs more notable and more nodulose, the colour agreeing somewhat, the soft rocks being pale, the hard rocks dark. The young shells are a little more depressed but conical and similar in shape and coloration. Type from Ned's Beach, Lord Howe Island. Length, 31 mm.; breadth, 26 mm.; height, 18 mm.

CELLANA ANALOGIA sp. nov.

(Plate xxxii., figs. 2, 14; Plate xxxiii., figs. 7, 8, 9.)

Shell larger than the preceding, more broadly oval, less elevated, sculpture more pronounced and general coloration more pallid. Colour white with faint darker lines only, inside all white, scapula a little duller, margin almost unmarked. Sculpture of numerous ribs, stronger and almost subnodulose, larger and smaller ribs irregularly alternating, a few standing out a little. Juveniles show the different origin of this species (which was at first regarded as an ecologic variant only) as the young shell is very depressed, white, with eight or nine notable rounded ribs, a few smaller ribs intervening.

Length, 37 mm.; breadth, 31 mm.; height, 17 mm.

Type from Roach (or the Admiralty) Islands, Lord Howe Island. The relations of these two species are at present obscure, the present species recalling a New Caledonian shell, hereafter named *eudora*, but not very clearly, while the former species, *howensis*, seems nearer the East Australian *tramoserica*.

CELLANA CONCILIATA sp. nov.

(Plate xxxiii., figs. 1, 2, 3, 19, 20.)

The common North Queensland shell has never been named, though it is very different from anything else.

Shell broadly oval, medium elevation, anterior slope a little convex, posterior straight, apex at anterior third. The shell with age broadens out posteriorly without increasing elevation, and forms a large thickened shelf all around the internal margin, while the tentacles leave a depression well marked on the shell. Sculpture of very numerous fine riblets, practically no concentric growth lines visible. Coloration blue-green with indistinct darker radial bands; inside, spatula of various shades of brown becoming paler with age; outside the spatula silvery blue, margin slightly marked with blue.

Length, 40 mm.; breadth, 34 mm.; height, 14 mm. Another 44 x 39 x 15.

Type from Keppel Bay, collected by H. Bernhard.

The young shell is elongate oval, thin, transparent, not much elevated. Coloration alternate radial bands of pale greenish and blackish green, at first the pale bands dominant but with age this is reversed, only narrow strips of the paler colour being seen. The sculpture is more pronounced, sometimes the ribs showing a slight nodulation.

Length, 21 mm.; breadth, 15 mm.; height, 7 mm.; 18 x 14 x 6 mm.

CELLANA SONTICA *sp. nov.*
(Plate xxxiii., figs. 10, 11, 12.)

Harvey Johnston studied the ecology of Caloundra, South Queensland, and molluscan specimens were sent to Hedley for determination. The common notable limpet was the Sydney *Cellana tramoserica*, but smaller shells were placed on one side. Among these are two species which so far have not been recognized in New South Wales nor collected elsewhere in Queensland.

Shell elongate oval, depressed, apex at anterior third, slopes slightly convex. Coloration dirty green with obscure darker markings but holding the shell up to the light a complex tessellate pattern is revealed. Dead shells astonish by showing a dozen notable red rays with almost as many less pronounced intervening with irregular wavy blue black streaks becoming V-shaped marginad. (Obviously the shell recorded by Shirley as "*eucozmia* Pilsbry".) The sculpture consists of distant faint rounded ribs (furnishing the red lines abovementioned) with a fine concentric threading over-running these.

Inside the spatula is dull brownish to grey, not clearly defined, outside silver marked with black lines.

Type from Caloundra, South Queensland.

Length, 30 mm.; breadth, 24 mm.; height, 9 mm.

CELLANA TURBATOR *sp. nov.*
(Plate xxxiii., figs. 16, 17, 18.)

Shell small, conical, rather regularly oval, elevated, apex at anterior third, eroded, anterior slope straight, posterior convex. Coloration greenish white with few black markings. Sculpture consists of coarse nodulose radials alternating larger and smaller, about twenty-five of each.

Inside silvery white, the spatula brownish, no definite marginal markings.

Length, 15 mm.; breadth, 12 mm.; height, 6 mm.

Type from Caloundra, South Queensland.

CELLANA EUDORA *sp. nov.*
(Plate xxxiii., figs. 13, 14, 15.)

Shell roundly oval, medium elevation, thick, apex subcentral, slopes slightly convex. Coloration pale green with a series of dark blotches round the shell near the margin, otherwise almost unspotted; inside pale silvery grey, the spatula outlined by a thick green line. Sculpture of fine radial ribs, massed into bunches of five to seven, elevated, about same width as intervals, eleven bunches being counted.

Length, 28 mm.; breadth, 25 mm.; height, 12 mm.

New Caledonia.

Type collected by A. F. Basset Hull at Lifou, Loyalty Islands; also secured at Bourail.

Family PUSIOSTOMATIDAE.

Gray brought in the genus *Engina* in Beechey's Voyage for two species, *zonata* and *elegans*, describing the animal only. The calligraphy of Gray was always very poor, and in the Synopsis of the Contents of the British Museum it was printed *Enzina*, and later in his List of Genera he also wrote *Enzina* and Mörch in 1852 accepted *Enzina*. As type of *Engina*, Gray himself selected *zonata*, but while the generic name *Engina* came into use, apparently through the Adams' Brothers' definition, Tryon mentioned that *zonata* Gray, was a lost species.

Tomlin (*Nautilus*, Vol. xlii., p. 40, October, 1928) has endeavoured to clear up the matter, but has only further complicated it. He has stated that, according to specimens in Gray's collection, *zonata* is a Mediterranean shell, which has never been figured. Consequently, we do not yet know what *zonata* means, while we do know that Beechey did not "voyage" in the Mediterranean. Then Tomlin has pointed out the well-known fact that Reeve's *zonata* was not Gray's, and has renamed it *melanozona*, suggesting that, although Reeve recorded it from the Gallapagos, that locality was almost certainly erroneous, and that it was common in the New Caledonian Region. But Cuming, from whose collection Reeve described his *zonata*, had no New Caledonian material, and such does not agree with Reeve's figure. The only conclusion possible is that *Engina* cannot be used for the local shells and that recourse must be made to *Pusiosstoma* Swainson, whose type is the well-known *mendicaria* auct., but not of Linné. The family distinction is necessary as sometimes the species have been classed under *Ricinula*, at others under *Columbella*, while Thiele has recently selected a more inappropriate place still, the Buccinidae. In addition to the Pusiosstomatoid forms a series of shells of narrower form, the spire long, the mouth more open with the diagnostic glaze and wrinkles present occur, and for these *Enzinopsis* gen. nov. is proposed, Hedley's *gannita* being named as type.

ENZINOPSIS RESTA *sp. nov.*

(Plate xxxii., fig. 11.)

Shell small, elongately fusoid, spire longer than aperture, mouth open, narrow, canal short and narrow. Coloration brownish white, irregularly marked with brown. Whorls six, apical whorls one and a half smooth, remainder strongly corded concentrically, four cords being counted on penultimate whorl, subdued longitudinal rounded ribs, eleven in number on the last whorl being overrun by the concentric cords. The mouth is oval, the columella ridged, the inner lip erect as a glaze which continues boldly across the body whorl, bearing ridges; the outer lip similarly ridged internally, six ridges apparent. Operculum leaf shaped, apex terminal.

Length, 12 mm.; breadth, 6 mm.

Lord Howe Island.

BEDEVA PENZA *sp. nov.*

(Plate xxxii., fig. 4.)

Many years ago a common Sydney shell was named *Trophon hanleyi* by Angas, but later the South Australian name *paivae* Crosse, was incorrectly preferred. The matter was corrected by Hedley, who, however, himself erred in considering that the local shell developed into and was represented in Queensland by *contractum* Reeve = *funiculatum* Reeve. That species was named *Ergalatax recurrens* from Port Jackson, and lives alongside *Bedeve hanleyi* here, and in South Queensland, and while the former ranges

northwards to Low Isles and further, a different shell takes the place of the *Bedeve* in those localities. This shell was recorded by Shirley as *Afer blosvillei* Deshayes, a determination due to some extralimital conchologist as Deshayes's species is a native of Ceylon.

The Lord Howe Island shell recalls the Sydney *Bedeve* but is larger and broader, measuring 31 mm. long by 19 mm. broad; the type of *hanleyi*, an elongate specimen, measured 30 mm. long by 14 mm. In the island species the longitudinal ribs are bolder and the concentric sculpture stronger, the inner lip more curved and the outer more angulate externally, and more boldly lirate internally and has a much more different appearance than this diagnosis would suggest.

LYRIA HOWENSIS *sp. nov.*
(Plate xxxii., fig. 3.)

Lamarck's *Voluta nucleus* was named without locality, but the name falls before the earlier *pattersonia* Perry, and it is obvious that both shells came from Norfolk Island, so that locality is here designated as the type locality. Perry's painting gives the characteristic features of the species, the purple coloration, broad shell and flattened ribs being rudely indicated. The Kermadec Islands shell is most like the Norfolk Island one but is narrower, the ribs more numerous and more sharply cut, and is here named *Lyria insignita* *sp. nov.* The species has been recorded from New South Wales, but the only specimens available from Newcastle are smaller, of a brown coloration and more heavily sculptured and is here called *Lyria peroniana* *sp. nov.* The Lord Howe Island shell differs in its green coloration and the ribs less pronounced and is nearer the New Caledonian species, *deliciosa* Montrouzier.

The shell is elongately oval, the spire pointed, shorter than the aperture, which is long and rather narrow. Coloration pale greenish with a bluish tinge in places with concentric somewhat distant broken brown lines. The apical one and a half smooth, purple, the succeeding whorls sharply closely ribbed longitudinally, the ribs fading very little on the body whorl where the base bears a few concentric grooves.

Lord Howe Island.

Length, 28 mm.; breadth, 14 mm.

COMINISTA NORFOLKENSIS *sp. nov.*
(Plate xxxii., fig. 12.)

This is one of the unexpected occurrences, a member of the family Cominellidae at Norfolk Island. The family is of Subantarctic range, Falkland Islands, Southern Australia and New Zealand. The molluscs are somewhat gregarious in the littoral zone, four genera with sixteen species and subspecies being listed by Powell in the Neozelanic Region. In Australia they are common in the south, a small species ranging into northern New South Wales, but it does not occur at Lord Howe Island. The Norfolk Island shell is, however, very like the Neozelanic *glandiformis* Reeve (olim *lurida* Hutton) and quite unlike the Australian species.

Shell small for the family, broadly subconoid fusiform, spire about equal to aperture, canal short open, mouth oval. Colour yellowish green concentrically lined with dull bluish and irregularly blotched with a similar shade, the darker coloration becoming obsolete in some cases and the shell dull. Apex of one and a half smooth whorls, adult whorls seven. Sculpture fine spiral threads above the shoulder, longitudinally below, a row of

nodules marking the periphery, twelve on last whorl where they develop into broad rounded ribs fading towards the canal where a rounded collar exists, with a couple of concentric grooves behind, the base with a few concentric lines. Columella sinuate connecting with outer lip by glaze, anteriorly twisting into canal, outer lip thin, subangulate below periphery of last whorl and rounded to a wide open canal. Nine raised lines inside outer lip. Operculum leaf shaped, apex terminal.

Length, 22 mm.; breadth, 12 mm.

Norfolk Island.

PLOCAMOTIS ILLUSUS sp. nov.

Although *Gena* is a common southern Australian shell it is much scarcer in the tropics. It occurs however at New Caledonia, but not at Lord Howe Island. Then it is found on Norfolk Island, but is not known from New Zealand or the Kermadecs.

The Norfolk Island shell is here described, and again it is not like the tropical forms but closely resembles the Sydney species *impertusa*. The coloration in the series is fairly uniform, beginning as a pale green but developing a purplish brown which dominates the adult shell, the paler coloration showing as more or less scattered triangular patches. This coloration is seen in the Sydney species, which however varies greatly from uniform dark to uniform light, with sometimes regular light banding. The shell is covered with dense closely packed striae, similar to that of the Sydney shell, but the striae are finer and more numerous. The New Caledonian shell is smooth. The Norfolk Island shell is smaller than the local one, measuring 16 mm. in length, by 9 mm. in breadth, but otherwise agrees very closely.

Family SIPHONARIIDAE.

The gregarious littoral limpet-like shells referred to this family in Australia have hitherto been commonly referred to the typical genus *Siphonaria*. In order to ascertain relationships exactly many species had to be examined, and it was found that many definable groups existed unnamed, the species being in a like state. While these molluscs constitute a very notable factor of the littoral molluscan fauna in southern Australia and New Zealand, and even in tropical Australia they are not prominent on Lord Howe Island, Norfolk Island or New Caledonia, although comparatively abundant at the Kermadecs, whence Oliver described many species. Yet it is not too easy to allot the small forms as the neighbouring species had to be determined, and almost twenty forms proved unnamed. While the species can be more or less easily separated when series are available and especially on the spot, it is much more difficult to distinguish them from descriptions and figures. This is due to the individual variation always seen in littoral molluscs through environmental stresses and years must be spent in the field before a working knowledge of the forms can be realised. Thus it has been found that the local species inhabit definite zones and can be collected in quantity without admixture save in their juvenile stages when they associate together. The animal features are known to differ throughout the world, the odontophore showing diagnostic variation, which has been used for generic separation which can be seen in the shells. Therefore for accurate differentiation group names are here introduced, the name *SIPHONARIA* being dismissed from the Australian fauna as its type is extralimital and its radular characters are unknown. In this place shell diagnoses are given by which means the molluscs can be easily determined.

- Shell medium, flattened, oval, "black" inside and out, coarsely ribbed, ribs angulate, primary ribs few and notable. *Mestosiphon*.
 Shell similar, flattened, apex excentric, pale inside and out, coarsely ribbed, ribs angulate, primary ribs few and notable. *Mallorisiphon*.
 Shell flattened, apex a little excentric, ribbing very subdued, pale inside and out. *Planesiphon*.
 Shell elevated, apex subcentral, ribbing coarse, primary ribs not pronounced, slopes convex, dark coloration outside, inside rayed with white. *Ellsiphon*.
 Shell elevated, apex subcentral, ribbing coarse and numerous, siphonal ridge composed of three ribs. *Triellsiphon*.
 Shell flattened, oval, ribbing coarse, ribs few, rounded, pale outside and inside, primary ribs pronounced. *Parellsiphon*.
 Shell elevated, irregularly oval, slopes straight, primary ribs very pronounced, but sometimes shell densely ribbed, at others ribs obsolete, general coloration whitish. *Legosiphon*.
 Shell very elevated, small, numerously ribbed, no primary ribs distinguishable, coloration dark, rayed inside. *Hebesiphon*.

Though these diagnoses read indefinitely consideration of shells indicate their necessity. Thus Mr. A. F. Basset Hull collected a series at Ponerihouen, east coast New Caledonia, and three species are separable at sight. First, a *Mestosiphon*, differing from the type, *eumelas*, in its paler coloration and smaller size with the anterior ribs more pronounced and more elevated. Second, a *Legosiphon*, again differing from the type, *optivus*, in its smaller size, more varied internal coloration and more anterior ribs. Third, a *Parellsiphon* which is flatter than the type, *zanda*, ribs more numerous and shows banded internal coloration recalling that of *Ellsiphon marza*. A large number collected by Mr. Chas. Hedley at Noumea confirm the lastnamed form, the shells being *Parellsiphon* with more the coloration of *E. marza* and obviously constitute a new species which may be called *Parellsiphon commixtus* nov. Another series from Presqile Ducos, Noumea, are all *Legosiphon* and again confirm the features mentioned, so that this may be called *Legosiphon multinus* sp. nov. The *Mestosiphon* must also be named, *parmelas* sp. nov., as it does not agree with the Vanikoro *atra*, the nearest species, otherwise.

Mr. G. P. Whitley collected a number of small shells at Rarotonga, and, while a few appear to be referable to *Mestosiphon* and *Parellsiphon*, the bulk introduce a new generic form, *Torquisiphon percea* gen. and sp. nov., the shell elevated, the apex excentric, twisted, recalling that of *Benhamina*, the ribs numerous, depressed, siphonal ridge moderate, coloration black, ribs paler, inside deep brown, margin rayed.

Length, 10 mm.; breadth, 8 mm.; height, 8 mm.

For many years a ghost, *Trimusculus*, overshadowed the generic name *Siphonaria*, but recently the ghost has been laid through the discovery of the original publication of the name. At my suggestion the status has been determined by Rehder (Proc. Biol. Soc. Washington, Vol. 53, pp. 67-70, June 28, 1940), and the type of *Trimusculus* Schmidt, 1818, fixed as *Patella mamillaris* Linné, a species allotted to the later *Gadinia* Gray, 1824, which name it will displace. The local shells hitherto arranged under *Gadinia* are not congeneric with the Mediterranean and West African species, and I here propose *Gadinalea* gen. nov., naming *Gadinia conica* Angas, as type. The local shell (*conica*) was described as with thirty-eight ribs, but this is

the extreme number. The shell is thin, white, subcircular, depressed or conical, multi-ribbed and with a siphonal groove internally. The radular characters differ notably from those of the Atlantic group. The local group reaches to both Lord Howe Island and Norfolk Island where, however, it has only as yet been rarely found and the specific distinction is uncertain.

ELLSIPHON MARZA sp. nov.

(Plate xxxiv., figs. 1, 2.)

Shell large, medium elevation, slopes convex, rounded oval, strongly regularly ribbed, ribs rounded, dual siphonal rib not greatly differentiated. Coloration green, inside liver, sometimes dark, sometimes pale, but always more or less rayed with white, the margin regularly marked. Sculpture of thirty to forty major ribs with many minor ribs developing in the intervals.

Type from Keppel Bay; collected by H. Bernhard.

Length, 38 mm.; breadth, 31 mm.; height, 11.5 mm.

This appears to be the northern representative of the New South Wales *scabra*, and is abundant at Caloundra and Keppel Bay, and ranges as far north as Port Douglas.

The Norfolk Island "*Siphonaria*" is known as *exulorum* Hanley, but only the name was published by Hanley. However, Suter has recorded a diagnostic comparison and the species may be thus known as *exulorum* Suter. It has not yet been figured and its exact relationship is doubtful, but perhaps a Fijian species is nearest. Meanwhile it is listed as *Ellsiphon* (?) *exulorum* Suter (Plate xxxiv., figs. 16, 17), and may be described thus:—Shell medium, elevated, rounded oval, apex subcentral, brown outside, ribs paler, inside dark liver margin marked with white, spatula bluish. About twenty-eight primary rounded ribs with a double siphonal rib, a few intercalating minor riblets. Juvenile shells show more white markings inside and out.

Length, 23 mm.; breadth, 19 mm.; height, 10 mm.

PARELLSIPHON ZANDA sp. nov.

(Plate xxxiv., figs. 7, 8.)

Shell medium, elongate oval, flattened, strongly roundly ribbed, dual siphonal rib very pronounced. Coloration pale greenish, inside greenish white, median area yellowish, margin not marked. The sculpture shows about fifteen major ribs with about as many small ones between.

Type from Low Isles, North Queensland.

Length, 24 mm.; breadth, 18 mm.; height, 5 mm.

Replaces *Ellsiphon* on the coral reefs of Queensland. On Low Isles the two were found, *Ellsiphon* being on the coralsand rock, while *Parellsiphon* lived on the coral blocks in the lagoon.

The light inside coloration, the strong ribbing and flattened shell make this recognisable, but at North West Island, Capricorn Group, a small distinct species was found which may be called

PARELLSIPHON PROMPTUS sp. nov.

(Plate xxxiv., figs. 24, 25.)

Shell small, flattened, elongately oval, anteriorly broader, ribbed, siphonal rib dual, about thirteen other single rounded ribs. Coloration greenish white uniform, inside the muscle impression brownish, outside unspotted white. Major ribs as above, no minor riblets save near siphonal ridge, where only a few occur.

Length, 12.5 mm.; breadth, 10 mm.; height, 4 mm.

PARELLSIPHON INNOCUUS *sp. nov.*

(Plate xxxiv., figs. 9, 10.)

Shell very small, elongate oval, elevated, many-ribbed, brownish, the ribs white, the siphonal dual ribs pronounced. Coloration brownish, ribs white, interior whitish rayed with brown, interior of muscle scar whitish, scar itself ill-defined brownish.

Sculpture of twenty to twenty-five major ribs and a few minor ribs, the juvenile showing eleven plus the dual rib.

Length, 11 mm.; breadth, 8 mm.; height, 4 mm.

Norfolk Island.

This species is smaller, less elevated, and different shape and stronger ribbing than *exulorum*.

With it are a few immature shells which appear to represent a species of *Mestosiphon*.

TRIELLSIPHON ACERVUS *sp. nov.*

(Plate xxxiv., figs. 22, 23.)

Shell small, subcircular, elevated, many-ribbed, whitish, siphonal ridge composed of three ribs fused together. Coloration greenish white outside; inside white, the muscle impression being pale greenish and similarly internally. Sculpture of about forty-five rounded attingent ribs all about the same strength, three coalescing to form the siphonal rib. There are no riblets apparent, the ribs being too closely packed.

Length, 17 mm.; breadth, 15 mm.; height, 6.5 mm.

Type from Canala, New Caledonia.

Quite unlike any other group, the composition of the siphonal ridge and multi-ribbing being characteristic.

MESTOSIPHON EUMELAS *sp. nov.*

(Plate xxxiv., figs. 5, 6.)

Shell medium, flattened, elongate oval, strongly ribbed, siphonal ridge of two conjoint ribs. Coloration uniform blackish outside and blackish brown inside. Sculpture of major distant ribs, rounded, with minor ribs in the intervals. In the juvenile about seven major ribs stand out distinctly, and in the adult the major ribs are about doubled with a few subordinate ribs between. The dual siphonal ribs project notably, and the succeeding posterior rib is distant.

Type from Snapper Island, North Queensland.

Length, 18 mm.; breadth, 14.5 mm.; height, 5 mm.

This species ranges along the Queensland coast through the tropics and has been called *atra* Quoy & Gaimard, but the Vanikoro shell has a much more even ribbing.

A small dark shell occurs among the coral blocks at Lord Howe Island and is here named *Mestosiphon lentulus* *sp. nov.* (Plate xxxiv., figs. 14, 15). Shell small, flattened, brownish to black, strongly acutely ribbed, siphonal dual rib very prominent. Coloration brownish to black uniform outside, uniform dark within. Anteriorly there are seven distinct ribs, and posteriorly six with a few minor intercalating riblets, as well as the dual rib. The major ribs are double those of a juvenile of the same size of the preceding species, and more prominent, the ribs projecting more marginad.

Length, 11 mm.; breadth, 8.5 mm.; height, 3 mm.

The juvenile shows more eccentricity than that of the mainland species with the anterior ribbing less pronounced.

MALLORISIPHON OPPOSITUS sp. nov.

From many places in Queensland the shell known as "*atra*" has been collected, and the name was selected for use on account of its uniform dark blackish coloration. Mr. H. Bernhard collected at Keppel Bay shells of the same appearance, but with a clear white internal appearance and pale brownish outside. Some have the inside of the muscle scar spotted or blotched with dark brown, while juveniles often show a pale liver and white rayed interior. However, these show the distinction from the "*atra*" series as the apex is notably excentric, that of "*atra*" being normal. The major ribs are more pronounced and remain so even in senile shells. Shell elongate to suboval, depressed, strongly ribbed, siphonal ridge of two fused ribs strongly elevated and projecting beyond the margin. The major ribs are very pronounced and number about twelve, minor riblets occurring between, but only rarely developing into a large size. Coloration in juvenile pale greenish, becoming darker to brownish outside, the interior greenish white, sometimes rayed with liver, generally whitening blotched with brown. The apex is excentric, the anterior area longer than the posterior and the siphonal side broader than the other.

Length of largest specimen, 28 mm.; breadth, 24 mm.; height, 7 mm.

Also collected at Facing Island, Port Curtis, and in Fiji a similar shell occurs, sent to this Museum under an entirely erroneous name.

LEGOSIPHON OPTIVUS sp. nov.

(Plate xxxiv., figs. 26, 27.)

Shell medium, conical, side slopes straight, oval, strong major ribs angulating margin, dual siphonal ridge prominent. Coloration white, brown speckles arranged concentrically in the intervals between the major ribs. Four major ribs adorn the anterior half, broader than the posterior which also bears four major ribs. The intervals bear three to seven minor ribs, the median one usually more pronounced than the others. Internally the coloration is striking, the white ground being clouded with a delicate brown, the muscle scar deepened into a dark shade, and a central dark brown blotch present.

Type from Magnetic Island, Queensland.

Length, 22 mm.; breadth, 18 mm.; height, 8 mm.

A characteristic group showing much local variation and the differences are difficult to evaluate at present. Thus the typical form is very like a Philippine Island shell, while we get three extreme forms otherwise in Queensland, excluding the wonderful *mirificus*. Thus from Green Island, off Cairns, Two Isles, north of Cooktown, and even at Fisherman Island, Port Moresby, Papua, the shell is still white, the interior less deep brown and the edges commonly rayed, but the sculpture is dense ribbing, forty fairly equal ribs being counted and the dual siphonal rib well marked but not outstanding greatly. On the other hand, from Lindeman Island, Lizard Island, Murray Island, the shells are boldly sculptured, but the coloration inside is brownish.

LEGOSIPHON MIRIFICUS sp. nov.

(Plate xxxiv., figs. 28, 29.)

Shell small, elevated, side slopes straight, smooth, the siphonal ridge only showing faintly. Coloration white, inside edge whitish succeeded by suffusion of brownish, the muscle scar dark reddish brown, inside pale brown, the centre dark brown.

Length, 19 mm.; breadth, 15.5 mm.; height, 8 mm.

Magnetic Island, near Townsville, Queensland. Collected by A. F. Basset Hull.

This is an extraordinary development as it shows the coloration inside and out of *L. optivus*, but the ribs are completely missing. Thousands of specimens belonging to this family have been handled, but nothing approaching such a form has been otherwise seen. Generally the ribbing is intensified and always the major ribs occur.

LEGOSIPHON DENSATUS *sp. nov.*
(Plate xxxiv., figs. 18, 19.)

Shell large, elevated, side slopes straight, densely ribbed, siphonal ridge of two ribs not fused, and not prominent. Coloration white with brown blotches, intervals of ribs sometimes darker. Sculpture of about thirty primary ribs with about the same number of minor intercalating ribs, the basic juvenal series not being distinguishable. Interior whitish, the margin marked with brownish, the muscle scar brown, internally darker.

Length, 28.5 mm.; breadth, 24 mm.; height, 12 mm.

Type from Port Douglas, North Queensland.

PLANESIPHON ELEGANS *sp. nov.*
(Plate xxxiv., figs. 3, 4.)

Shell small, thin, flattened, oval, the siphonal ridge indistinct, regularly sculptured with about twenty primary ribs, three or four fine riblets between each. Coloration pale greenish, inside greenish white, duller in centre, obscurely rayed with blackish. The ribs are low and not prominent, the intervening riblets being almost thread-like. The siphonal ridge is scarcely distinguished from the other primary ribs. It may be noted that the apex is excentric.

Length, 19.5 mm.; breadth, 15.5 mm.; height, 5 mm.

Collected by Mr. H. Bernhard at Keppel Bay, Queensland.

PLANESIPHON SORANUS *sp. nov.*
(Plate xxxiv., figs. 20, 21.)

Shell small, thin, depressed, suboval, siphonal ridge marked by a dual rib, otherwise the sculpture consists of about sixteen similar elevated rounded ribs, the interstices smooth or with one minor riblet. Coloration pale green, the ribs white. The ribbing is prominent through the white coloration. Inside the muscle scar is greenish, the edge white with a few dark rays.

Townsville, Queensland.

Length, 13 mm.; breadth, 9.5 mm.; height, 4 mm.

HEBESIPHON MONTICULUS *sp. nov.*
(Plate xxxiv., figs. 11, 12, 13.)

Shell small, oval, very conical, sides straight, sculpture regular ribs, siphonal ridge of two ribs little separated. Coloration dull brownish outside; inside muscle scar greyish to brown, the edge well and regularly marked with red radial colour lines agreeing with rib spaces. The ribs are elevated for size of shell, regular, about thirty in number, growth lines ornamenting the interstices.

Length, 10 mm.; breadth, 8 mm.; height, 8 mm.

Lifu, Loyalty Islands, New Caledonia.

TALISIPHON TASMANICUS Ten-Woods.

The species known as *S. zonata* Twds., must bear this name as already pointed out, but it is necessary to name the form from Port Fairy, Victoria,

which is almost smooth, measuring 19 mm. long by 15 mm. broad and 8 mm. high, so it is here called *T. t. nereis* subsp. nov. The West Tasmanian form, on the other hand, is very tall and more coarsely sculptured and may be named *T. t. turritus* subsp. nov., the type having been collected by Mr. A. F. Basset Hull at Macquarie Harbour, and measures 24 mm. long by 18 mm. broad by 15 mm. high, the typical South Tasmanian shell only reaching 12 mm. in height. The genus *Talisiphon* nov., is based on *virgulata* Hedley, the shell very elevated, sides straight, ribs numerous and flattened, siphonal ridge ill-defined, coloration dark, regularly rayed.

CUTTLEFISH BONES.

The "bones" of Cuttlefish have been well studied in Australia, where they are abundant at times on the beaches all round the coast, and continued examination has proved localization of the species and genera of Cuttlefishes. Hence a collection from Lord Howe Island should prove valuable as no Cuttles live in New Zealand. Seven forms of "bones" have been procured in some quantity by Mr. Robert Baxter, and six of these prove to be common Eastern Australian forms, while one is endemic. The lastnamed appears to be the common local species, and is a delightful evolution. At first sight it seems to be merely *Solitosipia mestus* from Sydney with the spine broken off. Upon examination it proves to be naturally spineless. The only spineless forms hitherto known from Australian waters belong to *Sepiella* and this only occurs in Northern Territory as yet. The Lord Howe Island shell is nothing like *Sepiella*, and agrees generally with *Solitosepia mestus*, save for the lack of the spine which is not seen even in the smallest specimen. The shell is therefore named *Blandosepia baxteri* gen. & sp. nov., the type measuring 74 mm. long by 32 mm. broad, the largest shell reaching 90 mm. by 37 mm.

At present the species stands alone, but later it is possible that the genus may include the *mestus* spined series, which disagrees from typical *Solitosepia* in many features.

EXPLANATION OF PLATES.

Plate xxxii.

- Figs. 1, 13. *Cellana howensis* Iredale.
 ,, 2, 14. *Cellana analogia* Iredale.
 ,, 3. *Lyria howensis* Iredale.
 ,, 4. *Bedeva pensa* Iredale.
 ,, 5, 6. *Scutus howensis* Iredale.
 ,, 7, 8. *Scutus olunguis* Iredale.
 ,, 9. *Macroschisma enopa* Iredale.
 ,, 10. *Calthalotia porteri* Iredale.
 ,, 11. *Enzinopsis resta* Iredale.
 ,, 12. *Cominista norfolkensis* Iredale.

Plate xxxiii.

- Figs. 1, 2, 3. *Cellana conciliata* Iredale.
 ,, 4, 5, 6. *Cellana howensis* Iredale, juv.
 ,, 7, 8, 9. *Cellana analogia* Iredale, juv.
 ,, 10, 11, 12. *Cellana sontica* Iredale.
 ,, 13, 14, 15. *Cellana eudora* Iredale.
 ,, 16, 17, 18. *Cellana turbator* Iredale.
 ,, 19, 20. *Cellana conciliata* Iredale (senile).

Plate xxxiv.

- Figs. 1, 2. *Ellsiphon marza* Iredale.
 „ 3, 4. *Planesiphon elegans* Iredale.
 „ 5, 6. *Mestosiphon eumelas* Iredale.
 „ 7, 8. *Parellsiphon zanda* Iredale.
 „ 9, 10. *Parellsiphon innocuus* Iredale.
 „ 11, 12, 13. *Hebesiphon monticulus* Iredale.
 „ 14, 15. *Mestosiphon lentulus* Iredale.
 „ 16, 17. *Ellsiphon* (?) *exulorum* Suter.
 „ 18, 19. *Legosiphon densatus* Iredale.
 „ 20, 21. *Planesiphon soranus* Iredale.
 „ 22, 23. *Triellsiphon acervus* Iredale.
 „ 24, 25. *Parellsiphon promptus* Iredale.
 „ 26, 27. *Legosiphon optivus* Iredale.
 „ 28, 29. *Legosiphon mirificus* Iredale.

BALI SHELLS.

By TOM IREDALE.

The island of Bali, situated at the eastern end of Java and separated by a narrow strait from Lombok to the west, is famous through the natural history world as the location of Wallace's Line. The co-formulator of the theory, now known as the Darwinian Theory, A. Russell Wallace collected land animals on the two islands, Bali and Lombok. To his amazement, though the natives spoke "Javanese", the animals on the latter place differed entirely, belonging to the Australian fauna, while those of Bali were typically Indo-Malayan. It was obvious that marine animals would not be amenable to the same laws as land animals, so that a collection of marine mollusca from Bali has been examined with interest. Mr. Ted Dranga, of Honolulu, has presented to the Australian Museum a collection of Balinese shells, numbering over two hundred and fifty species. These are so similar to a collection from North Queensland that nearly every species could be named at sight, most of the strangers occurring on the east of New Guinea, having travelled along the north coast of that island. Only one or two are unknown in these areas, such as *Marginella quinqueplicata* Lamarck, and a *Donax* quite unlike any local form, probably *Hecuba pubescens* Linn.